Analysis of LU/LC (Land Use/Land Cover) Change Detection Using GIS

1. Introduction:-

Change detection is the process of identifying differences in the state of an object or phenomenon by observing it at different times, Timely and accurate change detection of Earth's surface features provides the foundation for better understanding relationships and interactions between human and natural phenomena to better manage and use resources. [1][2]GIS is a set of tools for collecting, storing, retrieving, transforming and displaying spatial data from the real world. Economic development and population growth have triggered rapid changes to Earth's land cover over the last two centuries, and there is every indication that the pace of these changes will accelerate in the future. These rapid changes are superposed on long-term dynamics associated with climate variability.[4][5] Land cover change can affect the ability of the land to sustain human activities through the provision of multiple ecosystem services and because the resultant economic activities cause feedbacks affecting climate and other facets of global change. Accordingly, systematic assessments of Earth's land cover must be repeated, at a frequency that permits monitoring of both long-term trends as well as interannual variability, and at a level of spatial detail to allow the study of human-induced changes. Although the terms "land cover (LC)" and "land use (LU)" are sometimes used interchangeably, they are actually different. Simply put, land cover is what covers the surface of the earth and land use describes how the land is used. Examples of land cover classes include: water, snow, grassland, deciduous forest, and bare soil. Land use examples include: wildlife management area, agricultural land, urban, recreation area etc. Two land parcels may have similar land cover, but different land use. For instance, A golf course and an office building are both commercial land uses. The former would have a land cover of grass, while the latter would be considered built up. Change detection in GIS is a method of understanding how a given area has changed between two or more time periods. Change detection is helpful for understanding the change in forest coverage, ice sheets, and land use.[7][8] Change detection involves comparing changes between aerial photographs taken over different time periods that cover the exact same

geographic area. Change detection often involves comparing aerial photographs or satellite imagery of the area taken at different times. Change detection has been widely used to assess shifting cultivation, deforestation, urban growth, impact of natural disasters like Tsunamis, earthquakes and use/land cover changes etc.[6][3]

Problem Statement:

Nanded is most famous city with huge amount of public and private sectors industrial establishment and infrastructure and number of residential colonies. With the population growth, built-up areas in Nanded are rapidly increasing and it is evading to several environmental consequences (air and water pollution, traffic congestion, urban heat island formation, etc.) Hence the urban environment in Nanded is under severe stress due to the pressure of rapid urbanization. Consequently urbanization has deteriorated the overall quality of the urban environment in Nanded. In order to mitigate and minimize the detrimental effects associated with urban growth ***Land Use Land Cover Change Detection*** *is more important*

Motivation of Study:

With recent development of remote sensing technologies and increased remotely sensed data availability, identifying detailed spatial and temporal changes of urban areas and monitoring urban growth and LULC change have become more cost effective and success. For better monitoring regional complex LULC change, more comprehensively understanding the causes and consequences of urban expansion, and more accurately identifying typical patterns and trends required by planners and policy makers for better future planning and environmental management long term time series dynamic LULC change analysis is essential.

Aim of Study:

The aim of this study is to produce a land use land cover map of Nanded, to detect the changes that have taken place particularly in the built-up land and subsequently predict likely changes that might take place in the same over a given period.

Research Hypothesis:

The rural environments have unique spectral characteristics and the application of remote sensing provides a unique opportunity to study these requirements. The process of integration between remote sensing data, and developments in Computer Science (hardware and software) and mathematics (algorithms) allows for the mapping of the land use and natural land cover, thus ensuring access to the true spatial dimension of each type of land use. These technologies also allow the study and analysis of the changes in land use and natural cover over time, and the comparison of the current status of the region with how it was 30 years ago.

Contribution:

My research is analysis of change detection using satellite images over a given period of time past and future discussion and statistical gathering of data, which useful for future for city planning and we come to know that land cover and land use in past and what will be the condition in future for land use and land cover. This analysis will give you details about following factors or attributes

1) Agricultural
2) Water land
3) Waste land
4) Built Up

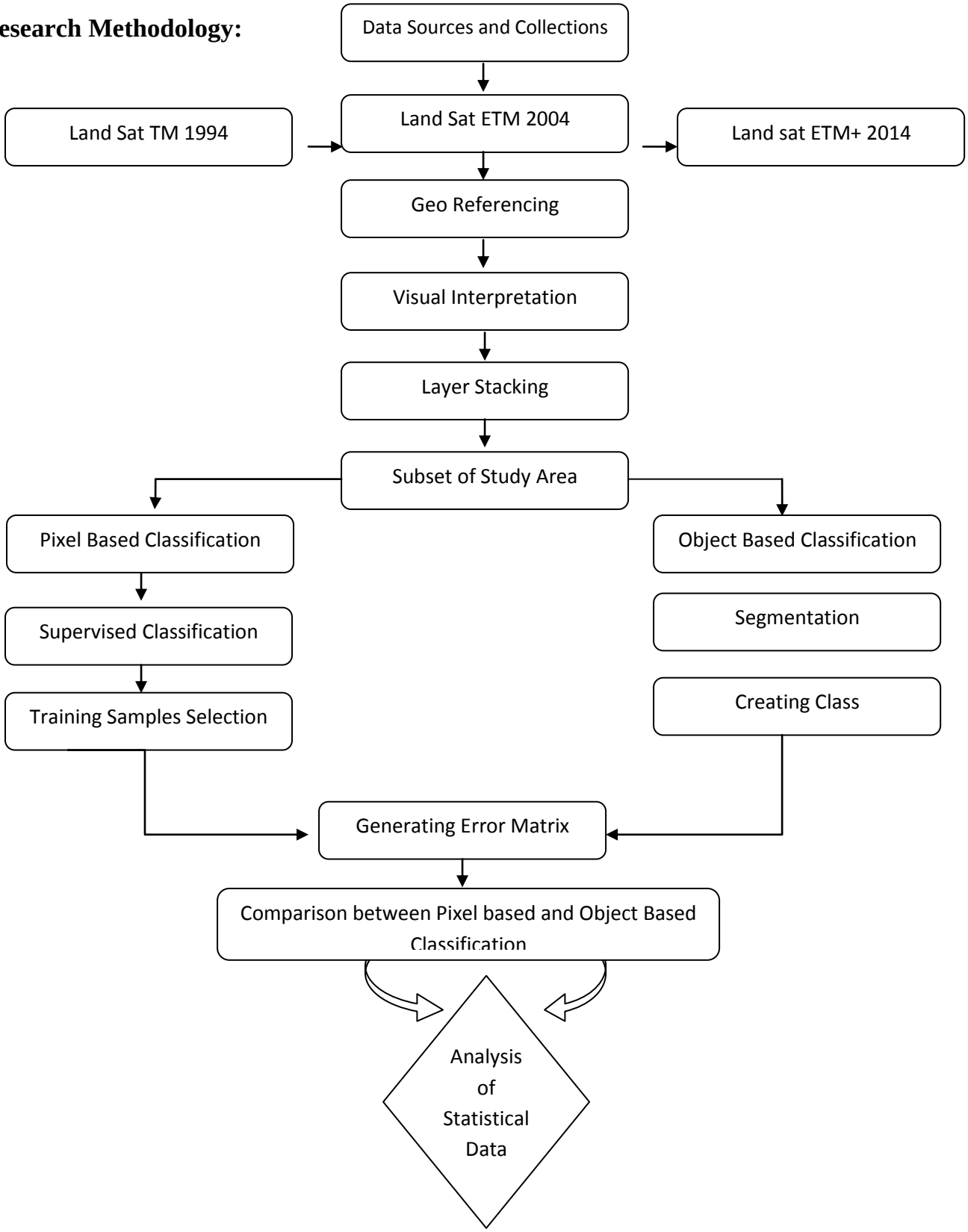
Research Questions:

1) What was the area of land use and land cover during the different period?
2) What are the major causes and consequences of land cover change?
3) What are the solutions for sustainable land management in the study area?

Objectives of Study:

1) Pixel based Land Use Land Cover Classification
2) Object based Land Use Land Cover Classification
3) Comparison between Pixel based and Object based Land Use Land Cover Classification.
4) Accuracy Assessment of pixel based and object based model.
5) Examine spatial transitions between different Land use categories
6) Implementation of CA-Markov, Model
7) Develop a model to predict and assess future land use changes and their impact.
8) To determine the trend, nature and magnitude of Land use Land cover change
9) To evaluate the socio – economic implications of predicted change.
10) To explore the spatial and temporal characteristics of urban expansion in different time period.
11) Provide a platform for future environmental studies concerned with LULC change.
12) To generate statistical data on land consumption.

Research Methodology:



Limitation of Study:

The major limitation of the study is that the resolution of all the three images is not the same. Therefore, accuracy of results yielded from 1994 image is less than that from 2004and 2014 image.

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